SECTION 7

PRELIMINARY BRIDGE PLANS

Refer to Section 17 of the NJDOT Procedures Manual for provisions governing submissions for new bridges and structures. Also, see Sections 9A and 9B of this Design Manual for provisions governing submissions for Reconstruction and Rehabilitation Contracts.

1.7.1 GENERAL

a. In the submission of Preliminary Plans, the submission should, as applicable, contain the following information:

1) Plan and elevation of a structure showing the following:

- elevation grades of the structure and immediate approaches
- span lengths
- skew
- controlling minimum horizontal and vertical clearances (also show the actual vertical clearance obtained)
- type of superstructure
- location of expansion and fixed bearings
- proposed elevations of bottom of footing shall be indicated together with the original ground line, finished ground line, and assumed rock line (if any)

2) Typical section of bridge showing the following:

- type, spacing and arrangement of beams
- widths of median
- traveled roadway
- shoulder (or curb offset) and curb or sidewalk
- type of railing or chain link fence
- type of parapet
- cross-slopes or superelevation

A preliminary drainage design and layout arrived at through accepted means, as described in Section 22 - Deck Drainage, shall be included in these documents.

3) Typical section of approach roadway showing median, roadway and shoulder dimensions, and location of guide rail, if any.

4) The plan sheet should include Notes about design loading, design allowable stresses, etc. and the specifications under which the structure is to be designed (see Subsection 1.7.3).

5) The plan sheet should show the location of borings and log identification number.

6) Foundation pile design loadings shall be noted on the preliminary plan.

7) Profiles of roadway on the bridge and lower roadway should be shown.

8) Location of bridge mounted signs shall be shown if information is available at the time of submission.

9) Location of subsurface utilities and proposed utilities in the superstructure should be shown.

10) Hydraulic and hydrologic data shall be noted on plans for waterway structures.

11) If a railroad crossing, show existing tracks, profile on tracks, proposed horizontal and vertical clearances and topography along the railroad. (A separate Railroad Agreement Plan is to be prepared in accordance with Subsection 1.4.5).

12) Where water crossings are involved, horizontal and vertical clearances selected should be covered in the submission. Any special inlet-outlet treatment should be shown. A copy of required permits should be included.

13) Any design project which involves any bridge with substandard clearance and/or rating shall be brought to the attention of the Manager, Bureau of Structural Engineering. If it is possible to improve the deficiency, a determination will be made as to the proper improvement.

A request for approval of the proposed improvement shall be formally submitted to the Manager, Bureau of Structural Engineering. If a Design Exception for any structural aspect is to be recommended, the criteria of Subsection 3.8 of the NJDOT Procedures Manual should be followed.

b. The Preliminary Submission shall include an evaluation of the proposed superstructure to determine if the structure warrants provision of an access mechanism whereby maintenance activities or inspections may be performed. If deemed warranted, the Designer shall recommend for approval to the Manager, Structural Engineering, installation of an underbridge access mechanism.

c. The Preliminary Submission shall consist of the following items:

- Preliminary Bridge Plans
- Design Appraisal Statement
- Foundation Report and Recommendation
- Construction Cost Estimate
- Seismic Retrofit Report (if applicable) (Refer to Section 45 of this Manual)
- Hydraulic and Scour Report (if applicable) (Refer to Section 46 of this Manual)

d. Preliminary bridge plans shall be on 594 millimeter by 841 millimeter sheets and be in bound sets.

e. For all structural submissions, the Bureau of Structural Engineering will review and approve Preliminary bridge submissions. On full Federal oversight projects, concurrence by FHWA on the Preliminary submission is required. For other processes, the Bureau of Structural Engineering will provide approval of Preliminary bridge submissions to the Project Manager.

1.7.2 RETAINING WALLS

The following methodology shall be followed in presenting a Preliminary Submission in which construction of retaining walls is planned:

a. Based on his preliminary engineering study of a project, the Designer shall recommend at the Preliminary submission what proprietary wall types can be included in the contract preparation or if site conditions limit the type of wall that can be utilized. Upon approval by the Manager, Structural Engineering, of recommended proprietary walls, the Designer shall prepare conceptual retaining wall plans. These plans will be referred to as **CONTROL PLANS**. Refer to d. below for information that is to be provided in the Control Plan.

Refer to Section 1.5.6 of this Manual for governing site conditions that may limit the wall type selection.

b. If site conditions warrant that only one proprietary manufacturer can be used, the Designer shall request and obtain approval to prepare complete plans for the suitable wall type. For such an occurrence, sole source justification is required. A waiver, as per the requirements of 23.CFR 635.411, must be obtained from the FHWA.

c. Upon approval, the proprietary wall systems that have been identified to be suitable for the Project, shall be listed in Section 519, Section 520 or Section 521 of the project Special Provisions.

d. Refer to Standard Drawings 2.14-1 and 2.14-2 for an example of a Control Plan presentation. The Control Plans shall include, but not be limited to, the following information:

1.) Plan and elevation views of the wall(s)

The Elevation view of wall(s) shall show existing and proposed ground lines, elevations at 7.5 meter intervals at the top of wall and proposed ground line (used to compute quantities), wall embedment (maximum elevation at top of levelling pad) and beginning and end of wall stations.

2.) Control data for horizontal and vertical alignment

3.) Specific/nominal limits of the wall(s)

4.) Locations of existing and proposed utilities

5.) Boring locations

6.) General Notes

7.) Right of Way limits / construction easements

8.) If warranted, construction sequence requirements, traffic control, access, and stage construction sequence

9.) Work Item Quantities table

10.) Estimate of Quantities Table

11.) Limits of Common Structure Volume

12.) Limits and requirements for drainage features within the Common Structure Volume, limits and requirements which will affect the construction or stability of the wall beneath, on top of, and behind the retaining wall.

13.) At stream location, high water and normal water levels and scour protection

14.) Design parameters (safety factors) which shall include, but not be limited to, the following:

- Allowable Bearing Capacity
- Soil Unit Weight
- Angle of Internal Friction
- Anticipated settlement
- If required, Foundation Subgrade Treatment

15.) Magnitude, location and direction of external loads due to bridges, sign structures, traffic surcharge, etc.

16.) Seismic criteria

17.) Sections through wall showing offset control point, pay area, ditches, sidewalks, superelevation and any unusual features

Guide Plates 3.4-7 through 3.4-11 may be used in presenting this information.

18.) General details showing:

- End of wall interfaces
- Wall/coping/barrier or barrier interfaces
- Drainage pipe and inlet details, slip joint details
- Compatibility with roadway plans
- Excavation, temporary sheeting, cofferdam requirements
- Architectural details (such as dimensional requirements, special wall features; such as facing finish, texture, color or planting)
- Location and size of any existing or proposed structures
- Location of overhead signs or roadway lighting
- Location and height of noise barrier, if applicable

e. Foundation Report and Recommendation

1.) When alternate retaining walls are to be included in a project, the Foundation Report shall provide complete detailed information as to the reason for recommendation of alternate type retaining wall systems. The Designer shall evaluate global external stability, sliding, overturning, slope stability, bearing pressure, settlement.

2.) The Report shall indicate the maximum elevation at the top of leveling pads or footings and the design foundation pressures at those elevations.

3.) If soil subgrade treatment, soil enhancements and/or unsuitable material removal is required, the Report shall clarify such recommendations along with potential effects that the recommendations may have on the various alternates.

4.) In order to permit the availability of the Report to the Contractor, the Designer shall assure that the most current Report is provided to the Project Manager.

1.7.3 GENERAL NOTES

The following notes (when applicable) shall be used as design criteria and shown in the right hand corner of the General Plan and Elevation Sheet for each structure. Notes 9 and 10 shall be deleted from the plan sheet at the time of the final submission.

1. Design Specifications

(a) 1996 AASHTO Standard Specifications for Highway Bridges, with current interims, as modified by Section 3 of the NJDOT Design Manual for Bridges and Structures.

(b) Allowable Fatigue Stresses based on Case 1 of AASHTO Table 10.3.2A.

2. Construction Specifications

(a) 1996 NJDOT Standard Specifications for Road and Bridge Construction as modified by the Special Provisions.

3. Live Load

(a) AASHTO MS 18 + 25% (MS 22.5) or tandem 108 kilonewton axles at 1.2 meter centers, whichever governs.

4. Concrete Design Stresses

(a) Specified Design Compressive Strength f'_c

(In accordance with the Retest Limit for Pay-Adjustment Items as specified in Table 914-4 of the NJDOT Standard Specifications and as may be modified by the Special Provisions)

Class A..... 28 megapascals
Class B..... 21 megapascals

(The retest limit for non-pay-adjustment items shall be as specified on the last line of Table 914-4 of the NJDOT Standard Specifications and as may be modified by the Special Provisions).

(b) Class Design Strengths

(In accordance with Table 914-3 of the NJDOT Standard Specifications)

Class A..... 32 megapascals
Class B..... 26 megapascals

(c) Allowable Stresses Extreme Fiber in Compression (fc)

Class A.....11.2 megapascals
Deck Slab of
Vehicular Bridges.....9.8 megapascals
Class B.....8.4 megapascals

5. Reinforcement Steel

(a) ASTM A615M (Grade 420) (fs) = 165 megapascals

6. Superstructure

* (a) Dead load includes a 1.2 kPa provision for a future 50 millimeter thick concrete overlay protective system on the bridge deck.

(b) Structural Steel: AASHTO M 270/M 270M, Grade _____
(ASTM A 709M/A 709, Grade _____) with Supplementary Requirements for Notch Toughness for all member components marked (T).

(c) See Structural Steel Plans for Cleaning and Painting Systems, and Finish Coat Color.

(d) See Structural Steel Plans for any member or member components designated FCM's under the Fracture Control Plan.

(e) See Prestressed Concrete Beam Plan Sheets for details and notes.

* This note is applicable only for bridges which utilize one-course deck slab construction in accordance with Subsection 3.3, "Dead Load" and Subsection 1.20.1(g), "Deck Slabs, Design Criteria", of this Manual.

7. Seismic Design Notes

Seismic Performance Category (SPC) _____
Acceleration Coefficient "A" = _____
Soil Profile _____

(Section 45 of this Manual should be referred to for guidance in providing this information.)

8. Borings

a)  Indicates location of borings.
Log No.

9. Foundation Design Criteria

(Summary on Project to Project basis)

10. Estimated Cost $ _____ Based on (Insert Year) prices.

In addition, for those construction projects that include pile foundations, and use of the Wave Equation Analysis Program (WEAP) or a CAPWAP Analysis is required, the following, but not limited to, information shall be provided under the Foundation Design General Notes criteria. For such projects, the Geotechnical Engineering Unit should be contacted for verification of required plan notes.

- Ultimate Pile Capacity
- Friction Driving Resistance
- If warranted, maximum soil resistance